

## IMPELLER OF CENTRIFUGAL FAN

### BACKGROUND OF THE INVENTIONS

#### 1. Field of the Invention

5 The present invention relates to an impeller of a centrifugal fan, and more particularly to an improvement of an impeller for use in a noiseless centrifugal fan of small diameter.

#### 2. Description of the Prior Art

10 As shown in the Japanese Patent Laid-Open No.13690/1999, many centrifugal fans wherein the noise is reduced have been proposed and realized. The conventional examination for reducing the noise in the centrifugal fan has been carried out, as a matter of course, with the sole object of the light load-low hydrostatic pressure region which making an operating sound, and the noise reduction in the entire region has not yet been realized.

15 FIG. 3 shows a conventional centrifugal fan. In FIG. 3, a reference numeral 1 denotes a casing, 2 denotes an impeller, 2-1 denotes blades, 2-13 denotes an inner peripheral surface of the blade 2-1, and 3 denotes a motor.

20 In FIG. 3, an air current flowing from an air suction port formed on one side wall of the casing 1 into an outer peripheral surface of the impeller 2 is generated by the rotation of the impeller 2. It is known that a noise level and an air blowing performance are varied according to the design of the blade 2-1 forming the impeller 2. However, the conventional examination was rather too much have a  
25 partiality for improvement of the light load-low hydrostatic pressure

region in the fan.

As stated above, in the conventional centrifugal fan, the reduction of the noise level could be realized in the light load-low hydrostatic pressure region making the operating sound. However, the operating sound at the high hydrostatic pressure region is tend to increase, and accordingly the reduction of the noise level has been realized practically in consideration of the balance between the noise level at the high hydrostatic pressure region and the noise level at the light load-low hydrostatic pressure region. The increase of the noise level at the high hydrostatic pressure region is undesirable in an application corresponding to the load of a wide range, for example. Accordingly, the needs of the reduction in noise at the high hydrostatic pressure region is increasing.

#### SUMMARY OF THE INVENTION

An object of the present invention is to provide an impeller of a centrifugal fan having a casing and a multi-blade impeller rotatably supported by a blade holding base in said casing, wherein when said impeller is rotated air is sucked from an air suction port formed on one side wall of said casing, and a centrifugal force is applied on said air, wherein air of high pressure is taken out through an outlet formed on a portion of an outer peripheral surface of said casing, and wherein an inner peripheral surface of the impeller is formed conically having a large diameter at the air suction port and a small diameter at the blade holding base.

Another object of the present invention is to provide an impeller

of a centrifugal fan, wherein the small diameter at the blade holding base is in the range of 70 to 90% of the large diameter at the suction port.

5 A further object of the present invention is to provide an impeller of the centrifugal fan, wherein the diameter of the inner peripheral surface of the impeller is reduced linearly from a portion of the suction port to a portion of the blade holding base.

10 These and other aspects and objects of the present invention will be better appreciated and understood when considered in conjunction with the following description and the accompanying drawings. It should be understood, however, that the following description, while indicating preferred embodiments of the present invention, is given by way of illustration and not of limitation. Many changes and modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes  
15 all such modifications.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical sectional view of a centrifugal fan of the present invention;

20 FIG. 2 is a diagram showing properties of the centrifugal fan of the present invention and the conventional centrifugal fan;

FIG. 3 is a vertical sectional view of a conventional centrifugal fan.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

25 An embodiment of the present invention will now be explained

with reference to FIG. 1. Parts of the fan which are similar to corresponding parts of the conventional fan shown in FIG. 3 have been given corresponding reference numerals and need not be further redescribed.

5 In FIG. 1, a reference numeral 2-10 denotes a marginal portion of a large diameter D1 of an inner peripheral surface 2-11 of the blade 2-1 at the air suction port, and 2-12 denotes a marginal portion of a small diameter D2 of the inner peripheral surface 2-11 of the blade 2-1 at the blade holding base.

10 According to the present invention, the diameter D1 of the inner peripheral surface 2-11 of the blade 2-1 at the air suction port is made larger than the diameter D2 of the inner peripheral surface 2-11 of the blade 2-1 at the blade holding base, so that the inner peripheral surface 2-11 of the blade 2-1 forms a conical surface, as  
15 shown in FIG. 1. The diameter of the inner peripheral surface 2-11 is reduced linearly from the portion at the air suction side to the portion at the blade holding base.

FIG. 2 shows properties of the centrifugal fan of the present invention and the conventional centrifugal fan.

20 In FIG. 2, an air quantity is plotted on the abscissa, a hydrostatic pressure and a noise are plotted on the ordinate, and solid lines show the property and the noise of the fan according to the present invention, whereas dotted lines shows the property and the noise of the conventional fan.

25 As apparent from FIG. 2, the noise of the fan of the present

invention can be reduced compared with that of the conventional fan in the high hydrostatic pressure region without degrading the properties of the fan.

5 It is preferable that the diameter D2 of the inner peripheral surface 2-11 of the blade 2-1 at the blade holding base is 70 to 90% of the diameter D1 of the inner peripheral surface 2-11 of the blade 2-1 at the air suction port and that the inner peripheral surface 2-11 is in the form of conical.

10 While this invention has been described with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art. Accordingly, the preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention. 15 The scope of the present invention should be defined by the terms of the claims appended hereto.